Abstract Submitted
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Dynamical conductivity across the disorder-tuned superconductor-insulator transition[1] MASON SWANSON, The Ohio State University, YEN LEE LOH, The University of North Dakota, MOHIT RANDERIA, NANDINI TRIVEDI, The Ohio State University — We study the superconductor-insulator transition (SIT) in both clean and disordered systems by calculating the dynamical conductivity $\sigma(\omega)$ and the bosonic (pair) spectral function $P(\omega)$ using quantum Monte Carlo simulations. We identify characteristic energy scales in the superconducting and insulating phases that vanish at the transition due to enhanced quantum fluctuations, despite the persistence of a robust fermionic gap across the SIT [1]. While $\sigma(\omega)$ shows a energy scale for absorption associated with a Higgs (amplitude) mode in the clean superconductor, disorder leads to enhanced low frequency absorption in $\sigma(\omega)$ on both the superconducting and insulating side of the transition. Disorder also expands the quantum critical region, due to a change in the universality class, with an underlying $T = 0$ critical point with a universal low-frequency conductivity $\sigma^* \cong 0.5$ ($4e^2/h$) [2].

[1] K. Bouadim, Y.L. Loh, M. Randeria, and N. Trivedi, *Nat. Phys.* 7 884 (2011)
[2] M. Swanson, Y.L. Loh, M. Randeria, and N. Trivedi, *arXiv* 1310.1073 (2013)

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